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# **Food Security in Central America**

## **An Update**

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# Food Security in Central America

This report is the third in a series of quarterly reports that USDA's Economic Research Service will produce under the Hurricane Mitch Reconstruction project on food security. These reports focus on the four individual countries most affected by the hurricane—El Salvador, Guatemala, Honduras, and Nicaragua. This report will examine food gaps in the four countries and the resource/land quality constraints to increasing agricultural output.

For the poorest countries, an increase in agricultural productivity is the key to improving food security. Distorted policies, limited resources, low input use, and little use of new technology are the principal factors constraining yields in some of the countries in this region.

## Factors Determining Food Consumption and Food Gaps

Domestic food production and imports are the principal components of food availability. Domestic production for staple commodities is the product of yield and area. In our food security model, yield is determined by the use of fertilizer, labor, and technology. Area responds to changes in net returns. The key determinants of commercial food imports are net foreign exchange earnings and food import prices.

Our model projects two food gaps. A *nutrition gap* is estimated to measure food insecurity. This gap represents the difference between projected food supplies and the food needed to support minimum per capita nutritional standards on the national level. A *status quo gap* is estimated to measure changes in food security. This gap represents the difference between projected food supplies and the food needed to maintain per capita consumption of the last 3 years.

## Crop Prospects and Food Gaps

In accordance with the Hurricane Reconstruction project, the Production Estimates and Crop Assessment Division of the Foreign Agricultural Service (FAS/PECAD) is using satellite imagery to monitor crop development in the four countries to assist in estimating crop area and yield. This information is then incorporated into our food security model to evaluate food availability and analyze its trend through 2010.

The information from PECAD has indicated dry conditions for some of the major agricultural producing regions of Honduras and Nicaragua. Imagery from June through September suggested some improvement, but the situation is still not normal. For example, as of mid-September, rainfall along the Pacific coast region in Nicaragua was 36 percent below what was expected at that point in the growing season. In the Northern and Central regions, rainfall was roughly 28 percent below expected levels.

As a result of this information, estimates of Nicaragua's grain output for 2000 have been reduced to 450,000 tons, 15 percent below the previous estimate for 2000. As a result of this decline, Nicaragua's status quo food gap for the year 2000 is estimated at 95,000 tons. The nutrition gap is more than twice that size at 231,000 tons. If production had remained at previously estimated levels, the status quo gap would have been only 15,000 tons. The nutrition gap would have still been high at more than 150,000 tons, reflecting the chronically nutrient-deficient diet of the Nicaraguans.

Food aid shipments to Nicaragua have averaged over 100,000 tons per year in the last 3 years. If shipments remain at this level in 2000, then the status quo food gap would be eliminated, meaning that per capita consumption levels could be maintained. However, a nutrition gap of more than 100,000 tons would remain, meaning that the diets of many Nicaraguans would continue to be nutritionally inadequate.

The weather conditions in Honduras do not appear to be as bad as those in Nicaragua, and therefore, no changes were made to its production data; as of late October, it is assumed that output will remain at 1999's level. In the long term, Honduras and Nicaragua will face significant nutritional food gaps. El Salvador and Guatemala are projected to meet their nutritional needs on the aggregate level.

### Food Gaps in Central America

Country	2000		2010	
	Status quo	Nutrition	Status quo	Nutrition
1,000 tons				
El Salvador	0	0	24.2	0
Guatemala	0	0	0	0
Honduras	49.8	169.6	0	119.9
Nicaragua	94.6	231.1	139.8	377.4

In El Salvador, grain production growth is projected at 1.8 percent per year, close to the historical rate. This rate will be sufficient to preclude nutritional food gaps as population growth is expected to slow to only 1.5 percent annually by 2010. However, imports, which account for about 30 percent of availability, are projected to almost stagnate; therefore, per capita consumption is expected to decline during the next decade.

In Guatemala, strong import growth of 4.6 percent per year is expected to offset very slow growth in grain output. Per capita consumption is projected to remain basically flat through 2010.

Growth in grain production is not expected to keep pace with population growth in Honduras. However, export growth of 8 percent per year is projected to increase import capacity and result in an increase in per capita consumption. However, food availability will fall short of meeting nutritional requirements.

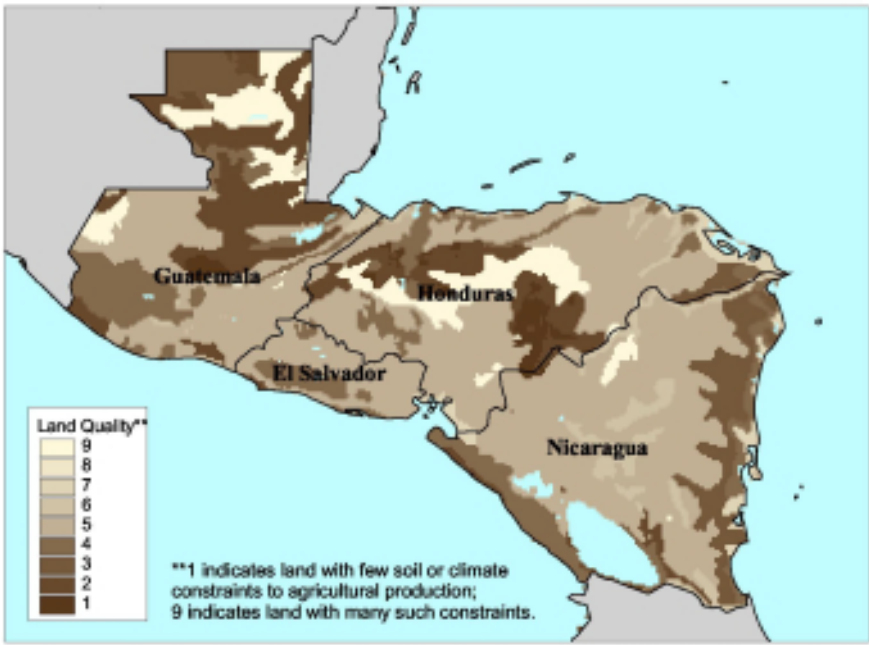
Nicaragua is the least import-dependent of the four countries reviewed in this report. During the next 10 years, imports will account for less than 10 percent of food availability. Grain production is projected to grow at about half the rate of population, thus resulting in a 0.7 percent per year decline in per capita consumption.

### Productivity Issues

Sustained growth in agricultural productivity is critical to improved food security for two reasons. First, productivity growth translates into larger food supplies and lower food prices for consumers. Second, productivity growth means higher incomes, and thus improved ability to purchase food and other basic necessities, for many food-insecure people who earn their livelihoods through agricultural production.

Map 1

### Land Quality in Central America

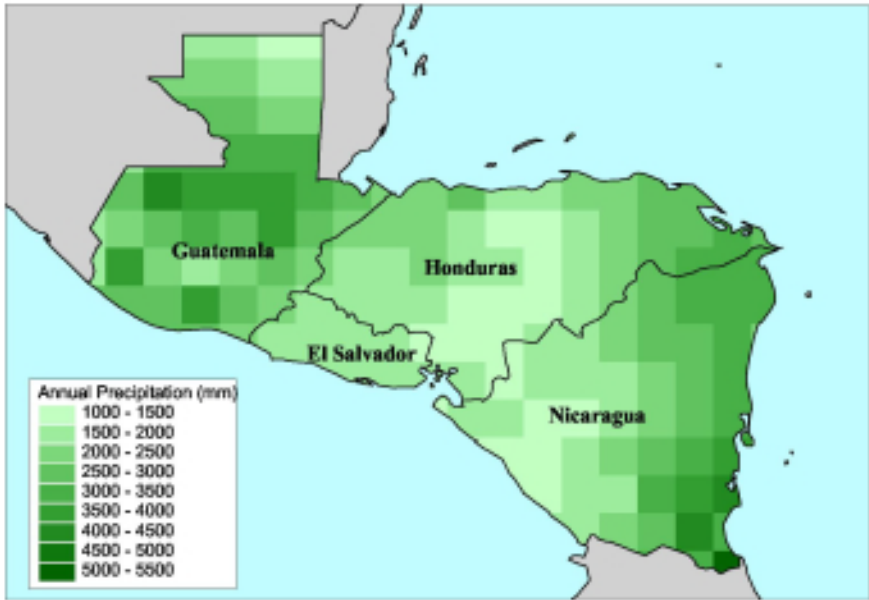


Source: Created by Vince Breneman and Chris Dicken, ERS, using data from the World Soil Resources databases of USDA's Natural Resources Conservation Service.

Agricultural productivity depends, in turn, on a variety of factors. Most differences in productivity, whether across households or countries or over time, can be attributed to differences in the quantity of agricultural inputs, such as land, labor, fertilizer, and machinery. But agricultural productivity also depends critically on the quality of inputs used. Recent advances in data and analytical methods allow improved understanding of the ways in which agricultural productivity and food security are affected by differences in the quality of natural resources.

Map 1 illustrates differences in land quality in El Salvador, Guatemala, Honduras, and Nicaragua, in terms of the suitability of soils and climate for agricultural production. This measure of land quality is based on assessments by USDA's Natural Resources Conservation Service of soil characteristics and long-term average temperature and precipitation. Extensive areas of high-quality land are evident in Honduras and Guatemala. Land is of lower quality, on average, in El Salvador and Nicaragua.

Map 2  
Average Annual Rainfall in Central America, 1961-96



Source: Created by Vince Breneman and Chris Dicken, ERS, using data from the Climate Impacts LINK Project (UK Department of the Environment Contract EPG 1/1/16). Climatic Research Unit, University of East Anglia.

Map 2 illustrates regional differences in average annual rainfall over the period 1961-96. Rainfall may be more equitably distributed on a regional scale than high-quality land is, but substantial variations remain across the region and within countries. Rainfall is highest, on average, in coastal areas of Nicaragua and Honduras and over much of Guatemala. Annual totals are generally lower in southern Honduras, eastern Nicaragua, and El Salvador.

Poor soils and climate do not make agricultural production impossible, but they do mean that costs of production are likely to be higher and/or that yields and net returns are likely to be lower than they would be under more favorable conditions. In other words, agricultural productivity is likely to be lower. Using high-resolution satellite data from the U.S. Geological Survey, map 3 illustrates where crop production actually dominates the landscape, based in part on land quality and rainfall patterns, along with other physical and economic characteristics. Concentrations are evident in southern Guatemala, central

Map 3  
Areas Where Crop Production Dominates the Landscape in Central America



Source: Created by Vince Breneman and Chris Dicken, ERS, using data from the Global Land Cover Characterization database created by the U. S. Geological Survey, the University of Nebraska-Lincoln, and the European Commission's Joint Research Center.

Agricultural Land and Water Characteristics in Central America

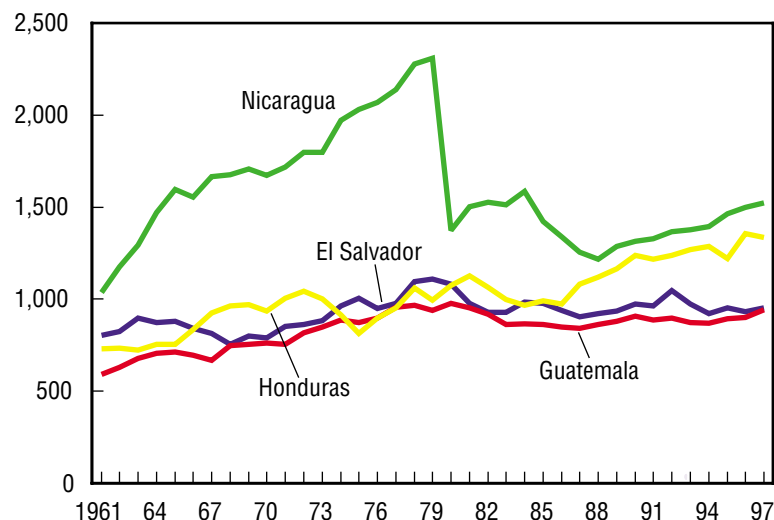
	Temporary cropland	Permanent cropland	Irrigated land	Rainfall on cropland	High-quality cropland
	— 1,000 hectares, 1997 —			Millimeters, 1996	Percent
El Salvador	565	251	120	1,729	2.7
Guatemala	1,360	545	125	2,647	25.7
Honduras	1,695	350	74	1,811	26.9
Nicaragua	2,457	289	88	2,159	12.0

Sources: Food and Agriculture Organization; USDA's Natural Resources Conservation Service; U.S. Geological Survey; and Climatic Research Unit, University of East Anglia.



## Agricultural Labor Productivity in Central America

International dollars per worker



Source: Food and Agriculture Organization of the United Nations.

Honduras, and central Nicaragua, although much crop production that takes place under the forest canopy is likely to be undetected by remote sensing.

Combining maps 1 and 3, we can estimate the share of each country's cropland that is of high quality. For Latin America as a whole, the median share of cropland in the best three land-quality classes is 27 percent. Of the four countries considered here, Honduras has the highest share of cropland in the best three land-quality classes (27 percent), followed by Guatemala (26 percent), Nicaragua (12 percent), and El Salvador (3 percent). Combining maps 2 and 3, we can estimate annual rainfall on cropland in each of the four countries. Rainfall on cropland in 1996 was highest in Guatemala (2,647 mm), followed by Nicaragua (2,159 mm), Honduras (1,811 mm), and El Salvador (1,729 mm).

The chart indicates that agricultural labor productivity has grown in all four countries in recent decades to about \$1,000 per worker per year in El Salvador and Guatemala and about \$1,500 per worker per year in Honduras and Nicaragua (which fluctuated most widely over the period). Econometric analysis of such trends suggests that, in Latin American countries with relatively poor soils and climate, such as the four considered here, agricultural productivity and thus food security are likely to respond most strongly to policy measures to improve efficiency in the use of basic inputs like fertilizer and water. In Latin American countries with better land, productivity responds much more strongly to improvements in labor quality, infrastructure, and mechanization, suggesting the need for investments in education, transportation, and capital.



The text in the "Productivity Issues" section of this publication was abstracted from the following:

Keith Wiebe and Abebayehu Tegene. *Resource Quality, Agricultural Productivity, and Food Security in Developing Countries*. Food Security Assessment 2000. U.S. Department of Agriculture, Economic Research Service, Forthcoming December 2000.

Keith Wiebe, Meredith Soule, Clare Narrod, and Vince Breneman. "Resource Quality and Agricultural Productivity: A Multi-Country Comparison." Selected paper presented at the Annual Meeting of the American Agricultural Economics Association, Tampa, Florida, July 31, 2000.

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